Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Materials and their Management
Module 4

Higher Tier

[GSC42]

GSC42

FRIDAY 25 FEBRUARY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the elements, is provided for you.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Only	
Marks	Remark

1 Glass recycling has greatly increased over the last ten years.

© Chris Garner http://www.pettistree.suffolk.gov.uk/images/bottlebankcimg1687crg.jpg

(a) Describe the main steps in the recycling of glass.

_____

_____

_____

_____ [3]

(b) Waste glass is dangerous and causes litter problems because it is very unreactive and is non-biodegradable.

(i) Explain fully the meaning of the term **non-biodegradable**.

_____

_____ [2]

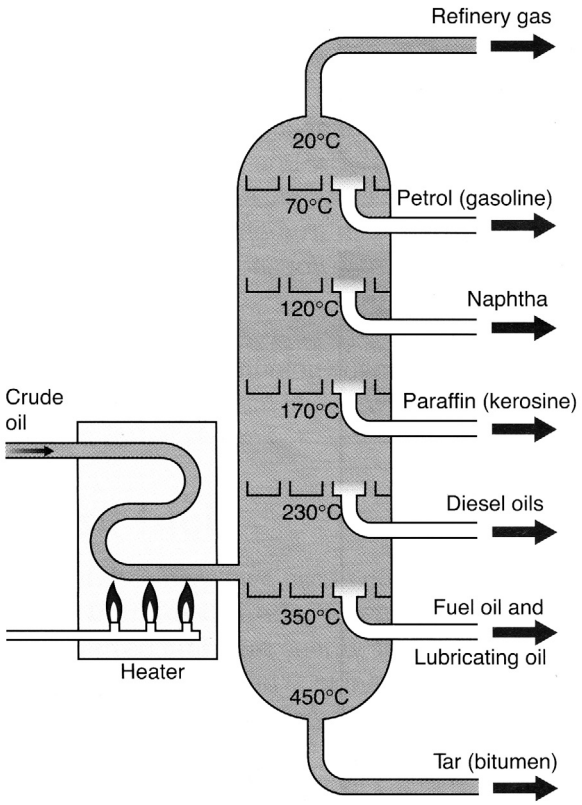
(ii) Give two ways in which local councils are promoting the recycling of glass.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

2 Crude oil is made up of many hydrocarbons and these can be separated using fractional distillation.



(a) (i) Describe how fractional distillation separates the fractions in crude oil.

_____

_____

_____

_____ [3]

(ii) Give **one** use of the paraffin fraction.

_____ [1]

(b) Ethene is an important hydrocarbon which is used to make polythene.

Describe what happens to ethene molecules when they are polymerised to form polythene.

_____

_____ [2]

(c) The Clean Air Acts were introduced by government to help reduce the problems of air pollution.

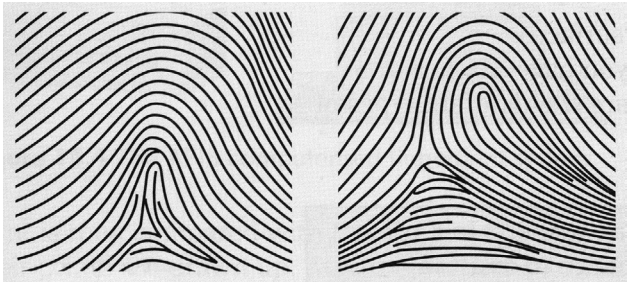
Give one way of reducing the problems caused by burning hydrocarbon fuels.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 **(a)** The following two fingerprints were found on the window of a stolen car.



A B

(i) Name the two types of fingerprint patterns found on the stolen car.

A _____

B _____ [2]

(ii) Name a suitable powder for obtaining fingerprints on the window of the car.

_____ [1]

(iii) How can forensic scientists use the fingerprints found at the scene of the crime to convict the person who has committed the crime?

_____

_____

_____ [2]

(b) The government has discussed the possibility of having a national database of fingerprints.

(i) Suggest what the national database would contain.

_____

_____ [1]

(ii) Suggest one advantage of a national database.

_____

_____ [1]

Examiner Only	
Marks	Remark

4 Soap solution was used to test the hardness of four water samples (A, B, C and D). Each sample was tested by shaking 10 cm^3 with 20 drops of soap solution. The tests were then repeated with samples which had been boiled for one minute and then with samples which had equal amounts of washing soda added. The results are shown in the table below.

Sample	**Test 1 Before boiling**	**Test 2 After boiling**	**Test 3 Washing soda added**
A	Lather	Lather	Lather
B	No lather	Lather	Lather
C	No lather	Lather	Lather
D	No lather	No lather	Lather

(a) From the table which result (A, B, C or D):

(i) shows a soft water area only? _____ [1]

(ii) shows an area of permanent hard water only? Explain your answer.

_____

_____

_____ [2]

(b) Give two things that were done in the investigation to make the results valid (fair test).

1. _____

2. _____ [2]

(c) The investigation tested two methods of softening hardwater. Give one other method.

_____ [1]

(d) Temporary hardness in water is caused by calcium hydrogen carbonate.

Examiner Only	
Marks	Remark

(i) Give the chemical formula for calcium hydrogen carbonate.

(You may find your Data Leaflet helpful.)

_____ [1]

(ii) Give **one** advantage of hardwater.

_____ [1]

(iii) Complete the word equation to show how kettle fur forms.

Calcium hydrogen carbonate $\rightarrow$ calcium carbonate + _____ + _____ [2]

Examiner Only	
Marks	Remark

5 Many organic chemicals from oil have important uses.

(a) Give the molecular formula for ethene.

_____ [1]

(b) Draw the structural formula of propane (C_3H_8) showing all the chemical bonds.

[2]

(c) Give two reasons why polypropene is a suitable material for making nets for fishing.

1. _____

2. _____ [2]

(d) Ethene is obtained by the thermal cracking of decane. Explain fully the meaning of the term **thermal cracking**.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

6 **(a)** Each of the balanced symbol equations has one incorrect formula. Put a circle round the incorrect formula.

One has been done for you.

A $2H_2 + O_2 \rightarrow$ (2HO)

B $C_2H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

C $C_{10}H_{22} \rightarrow C_7H_{18} + C_2H_4$

D $CaCO_3 + 2HCl_2 \rightarrow CaCl_2 + H_2O + CO_2$ [3]

(b) From the equations above (**A**, **B**, **C** and **D**) identify the reaction which represents:

(i) the removal of fur from an element in a kettle.

_____ [1]

(ii) the cracking of a hydrocarbon in an oil refinery.

_____ [1]

(iii) the burning of a fuel obtained from oil.

_____ [1]

(c) Give the formula of the chloride ion in calcium chloride.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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